Missouri Department of Natural Resources

Total Maximum Daily Load Information Sheet

Spring Creek (Branch)

Waterbody Segment at a Glance:

County: Dent
Nearby Cities: Salem
Length of impairment: 0.3 miles
Pollutants: Biochemical Oxygen Demand (BOD) and Volatile Suspended Solids (VSS)
Source: Salem Wastewater Treatment Facility (WWTF)


State map showing location of watershed

TMDL Priority Ranking: High

Description of the Problem

Beneficial uses of Spring Creek

- Livestock and Wildlife Watering
- Protection of Warm Water Aquatic Life
- Protection of Human Health associated with Fish Consumption

Use that is impaired

- Protection of Warm Water Aquatic Life

Standards that apply

- The Missouri Water Quality Standard (WQS), found in 10 CSR 20-7.031 Table A, for dissolved oxygen (related to BOD) in streams is 5.0 mg/L (milligrams per liter or parts per million) or the natural dissolved oxygen profile of the stream, whichever is less.
- The standards for volatile suspended solids (VSS) may be found in the general criteria section of the WQS at 10 CSR 20-7.031(3)(A) and (C). Here it states:
  - Waters shall be free from substances in sufficient amounts to cause the formation of putrescent, unsightly or harmful bottom deposits or prevent full maintenance of beneficial uses
  - Waters shall be free from substances in sufficient amounts to cause unsightly color or turbidity, offensive odor or prevent full maintenance of beneficial uses

Background Information and Water Quality Data

Any waterbody that was listed for Non-filterable Residue (NFR) in 1998, such as Spring Creek (also called Spring Branch), is now being listed for Volatile Suspended Solids (VSS). This change was made to better distinguish between organic solids coming from wastewater treatment plants (VSS) and mineral solids (soil or mineral particles) coming from soil erosion or erosion of mine waste materials or stockpiles (Non-Volatile Suspended Solids or NVSS).

A water quality study in 1985 (Table 1.) indicated this stream had problems with deposition of solids and low levels of dissolved oxygen downstream from the Salem Wastewater Treatment Facility (WWTF). Wastewater high in Biochemical Oxygen Demand (BOD) reduces the amount of dissolved oxygen in the stream's water. Most aquatic organisms require high levels of oxygen to survive. In addition, volatile suspended solids (VSS) can settle onto the bottom of a stream and smother natural substrates (materials in the streambed), aquatic invertebrate animals (like mayfly larvae and crayfish) and fish eggs. Two more-detailed water quality surveys in July and in August 2003 (Table 2.) indicated the Salem WWTF was having less impact on Spring Creek. Like all wastewater discharges in Missouri, the Salem WWTF has to meet the requirements of a discharge permit issued by the department that is designed to protect the water quality of the receiving stream. The problems in this stream will be addressed through the permitting process.

Table 1. Water Quality Survey of Spring Creek near Salem, Aug. 18, 1985

Site #	Location	Flow (cfs)	Temp (C)	A.M. D.O. (mg/L)	TSS (mg/L)	pH (SU)	BOD (mg/L)
2	Spring Creek 50 yards above WWTF	0.75	21	10.6	4	7.8	2
2	Salem WWTF effluent				800		160
2	Spring Creek 50 yards below WWTF		20	6.5	184	7.8	48
3	Spring Creek 0.5 mile below WWTF		20	**4.4**	8	7.8	3
4	Spring Creek 1.0 mile below WWTF	1.5	20	6.8	14	7.7	3
Off the map	Spring Creek 5.0 mile below WWTF	4.0	21				

Source: Missouri Department of Natural Resources

Key for Tables:

Flow in cubic feet per second;Temp=Temperature in degrees Celsius; A.M. D.O.= morning Dissolved Oxygen in milligrams per liter; TSS=Total Suspended Solids (sum of VSS and NVSS); pH in Standard Units;NH3N= ammonia as nitrogen; NO3N=nitrate as nitrogen; CBOD=Carbonaceous Biochemical Oxygen Demand (related to BOD and DO)

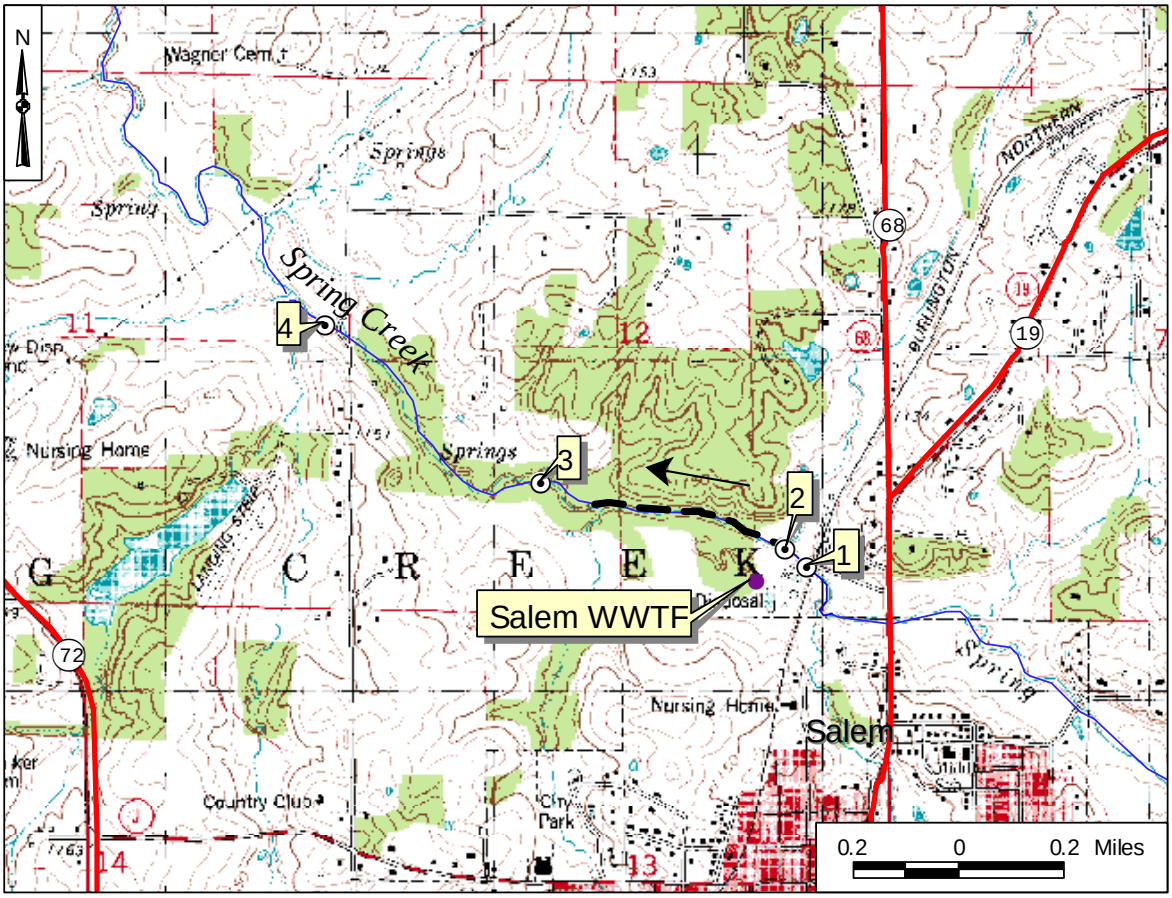
Table 2. Mean Early Morning Water Quality in Spring Creek near Salem, July and August, 2003

Site #	Location	Flow (cfs)	D.O. (mg/L)	NH3N (mg/L)	NO3N (mg/L)	Total Phosphorus (mg/L)	CBOD (mg/L)
1	Spring Creek 0.1 mile above WWTF	0.17	4.3	0.03	0.36	0.06	1.4
2	Salem WWTF effluent		3.7	0.05	17.52	2.22	<2

4	Spring Creek 1.0 mile below WWTF	1.94	4.6	0.02	6.64	1.81	<2
Off map	Spring Creek 4.2 mile below WWTF	2.92	4.9	0.03	3.06	0.38	<2
Off map	Spring Creek 5.0 mile below WWTF	4.13	5.1	0.04	2.71	0.35	<2

Source: Missouri Department of Natural Resources

Spring Creek in Dent County, Missouri, Showing the Impaired Segment



Impaired Segment ← Direction of Flow

Site Index

1-Spring Creek about 100 yards (stated as 0.1 mile in Tables) above WWTF
2-Salem WWTF effluent
3-Spring Creek 0.5 mile downstream of WWTF
4-Spring Creek 1.0 mile downstream of WWTF

For more information call or write:

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